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The Effect Of Adrenaline Use On The Rate Of Recovery Of Spontaneous Circulation (ROSC) In Out-Of-Hospital Cardiac Arrest: A Field Study In The Saudi Red Crescent Authority

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Abstract:

This study aimed to analyze the effect of using adrenaline on the rate of restoration of spontaneous circulation (ROSC) in out-of-hospital cardiac arrest cases, through the field practices of Saudi Red Crescent Authority paramedics. The study used the descriptive analytical approach to determine the relationship between the timing and dose of adrenaline and the outcomes of cardiopulmonary resuscitation (CPR), as well as to identify the field factors that influence success. The results showed a strong positive trend towards the effectiveness of adrenaline, with participants confirming that early and regular administration according to approved protocols clearly increases the chances of restoring spontaneous circulation (ROSC) and improves field outcomes. The statistical analysis also showed a high mean (4.43) with significant significance ($p < 0.05$), reflecting a high degree of agreement among the sample members regarding the importance of the timing and dose of adrenaline in saving out-of-hospital cases.

Keywords: Adrenaline – Restoration of Spontaneous Circulation (ROSC) – Cardiopulmonary Resuscitation (CPR) – Out-of-Hospital Cardiac Arrest – Saudi Red Crescent Authority – Medical Protocols.

Introduction

Out-of-hospital cardiac arrestOHCA is a medical challenge that requires immediate and effective intervention Advanced cardiopulmonary resuscitationCPRattempts including the administration of medications are the key to managing these cases Adrenaline is the most widely used and recommended drug in resuscitation protocols worldwide Its primary use is to achieve vasoconstrictive and cardiostimulatory effects leading to increased coronary and cerebral vascular pressure which is believed to be necessary to improve the chances of recovery of spontaneous circulation ROSC However although adrenaline may facilitate ROSC in the short term controversy remains regarding its ultimate impact on neurological outcomes and long-term survival Given the discrepancy in global clinical trial results on the true benefit of adrenaline on the ultimate outcomes of out-of-hospital cardiac arrest there is a need to evaluate its effectiveness within specific local trends and practices The Saudi Red Crescent Authority works to provide first aid and emergency medical care in the Kingdom and applies approved treatment protocols for managing cardiac arrest outside the hospital Conducting a retrospective or prospective field study within the scope of the Authority's work provides an opportunity to analyze the effect of using adrenaline on the rates of restoration of spontaneous circulation ROSC in patients who are treated by ambulance teams Taking into account demographic factors and the time interval until drug administration The quality of cardiopulmonary resuscitation provided in the Saudi environment1,8

Therefore the field study aims to determine whether the use of adrenaline by Saudi Red Crescent Authority teams contributes positively and tangibly to increasing ROSC rates Compared to cases that did not receive

the drug or received it at different doses or timings the results will help better understand current practice and its direct impact on initial resuscitation rates They may also contribute to providing evidence-based recommendations for modifying and improving advanced cardiopulmonary resuscitation protocols applied by the Authority with the aim of maximizing patients' chances of restoring spontaneous circulation and thus improving clinical outcomes for out-of-hospital cardiac arrest patients in the Kingdom of Saudi Arabia 2,9

Discussion

Cardiac arrest is considered It is a life-threatening medical emergency that occurs when the heart suddenly and unexpectedly stops pumping blood effectively throughout the body It should not be confused with a heart Although a heart attack may be one of the most common causes of cardiac arrest In the event of cardiac arrest the patient immediately loses consciousness and stops normal breathing Clinically cardiac arrest is characterized by the absence of a palpable pulse which leads to an immediate interruption in the supply of oxygen and nutrients to vital organs especially the brain and the heart itself This rapid interruption in pumping is what makes cardiac arrest a clinical death condition that requires immediate cardiopulmonary resuscitation CPR and defibrillation if necessary for the chances of survival The physiological mechanism that leads to cardiac arrest is usually translated as To one of three main heart rhythms that can be observed on an electrocardiogramECGwhich is ventricular fibrillation It is the most common rhythm and is treatable with electric shock5,6

In this case the muscle fibers of the ventricles the lower chambers of the heart fail The heart contracts in a coordinated manner but trembles in a random and chaotic manner This trembling prevents the heart from pumping blood effectively and is considered the main cause of sudden cardiac arrest The second rhythm is pulseless ventricular tachycardia It is a very fast and regular rhythm that originates in the ventricles Despite the relatively regular electrical activity excessive speed does not allow the ventricles to fill with blood sufficiently before contraction making pumping ineffective and leading to the absence of a pulse This rhythm is also susceptible to fibrillation The third rhythm is the cessation of electrical activity pulseless electrical activity Where the electrical and mechanical activity of the heart stops completely and a straight line appears On the ECG there is organized electrical activity on the ECG but the heart fails to produce an effective pulse or sufficient contraction force to pump blood This is often due to treatable causes such as severe hypoxia acidosis or a large pulmonary embolism10,9,6

Once the blood pumping stops A series of devastating physiological events known as the ischemic cascade begins leading to Interruption of blood circulation to acute hypoxia Which deprives the brain and heart muscle of the oxygen needed to produce energy Through the aerobic pathways and also to the transition to anaerobic metabolism where the cells begin to use glucose to produce energy in an anaerobic manner which results in lactic acid and causes metabolic acidosis in the tissues This acidosis inhibits the function of the cardiac muscle and vital enzymes as well as a disruption in the function of ion channels where the work of vital ion pumps such as the sodium and potassium pump stops which leads to the accumulation of calcium inside the cells and this accumulation leads to the destruction of the energy-dependent cell structure and cell death Also in sensitive nerve cells in the brain if blood circulation is not restored within a few minutes brain damage is permanent5,3

- **Adrenaline Composition The chemist And the mechanism Impact Pharmaceutical**

Adrenaline is also known as epinephrine And he is Hormone and transmitter Nerve belongs to a group of compounds called Catecholamines It is produced and secreted primarily by the adrenal medulla And some nerve cells The chemical structure of adrenaline consists of a catechol ring and a benzene ring containing two adjacent hydroxyl groups An ethylamine chain is attached to it and adrenaline is a derivative of the amino acid tyrosine It is produced through a series of enzymatic steps that include dopamine then norepinephrine noradrenalinewhich is then converted into epinephrine by the enzyme phenethanolamine-N-methyltransferase This chemical composition6,9

is what gives it its polar properties and its ability to bind to adrenergic receptors throughout the body Adrenaline also acts as a drug and neurotransmitter by binding to adrenergic receptors They are found on the surface of target cells in various tissues of the body These receptors are divided into two main categories Alpha receptors and beta receptors each of which is divided into subtypes Adrenaline is an agonist Non-selective meaning it activates all types of adrenergic receptors but to varying degrees depending on the dose and tissue After binding these receptors which are usually protein -coupled receptors begin to In launching a cascade of signals within the cell that leads to the desired physiological response5,7

result from its activity on various receptors and are designed primarily to prepare the body for a state of fight or flight The effects of alpha when activated lead to constriction of blood vessels Mainly in the skin viscera renal vessels and in cases of cardiac arrest this effect is necessary to increase the pressure of the coronary artery and brain feeding which improves the chances of blood supply to vital organs and restore spontaneous circulation ROSC and the effects of beta1 are concentrated in the heart and lead to an increase in the force of contraction and heart rate And the speed of electrical conduction This enhances the efficiency of the heart and helps to resume the pulse as well as the effects of beta2 its activation leads to the expansion of the bronchi In the lungs which facilitates breathing it also causes the blood vessels of the skeletal muscles to expand which increases blood flow to them in preparation for exertion Therefore adrenaline acts as a powerful stimulant of the sympathetic nervous system combining increased nutrition of vital organs through Alpha and beta improve heart function7,11

- **role adrenaline in Resuscitation Cardiac Pulmonary**

advanced cardiopulmonary resuscitationCPRprotocols is to cause severe vasoconstriction This is done primarily by activating alpha receptors This vasoconstriction leads to an increase in diastolic blood pressure where Diastolic blood pressure increases during chest compressions vital Because it increases the pressure of the coronary artery supply It is the difference between the diastolic pressure in the aorta and the pressure in the right atrium and maintaining the pressure supplying the coronary arteries is usually sufficient Above mmHg is a strong indicator of the likelihood of recovery of spontaneous circulation 20 ROSC This ensures that blood and oxygen reach the heart muscle which needs energy to respond to defibrillation or resume spontaneous heartbeat9,6

In addition to its vascular effect adrenaline acts as a potent agonist of beta-1 adrenergic receptors in the heart This activation increases the force of myocardial contraction making the heart more capable of pumping when heartbeat resumes It also increases the heart rate although this effect may not be apparent initially during cardiac arrest However it supports the initiation of effective mechanical activity of the heart after achieving ROSC and also increases the excitability of the heart muscle which increases the chance of the heart responding to electrical shock in cases of ventricular fibrillation Pulseless ventricular tachycardia It is easy to transform a chaotic rhythm into a rhythm of order10,6

Although adrenaline clearly improves short-term recovery of spontaneous circulation ROSC rates its use is surrounded by considerable controversy regarding long-term outcomes Some studies have shown that the use of adrenaline is associated with an increased ROSC rate but it may not necessarily improve survival with good neurological outcomes This is due to potential side effects of adrenaline such as increased cardiac oxygen consumption Which may increase ischemic damage when blood circulation is restored and harmful microscopic effects Especially on cerebral micronutrients after ROSC Therefore many studies and modern resuscitation guidelines emphasize that adrenaline should be administered as quickly as possible after the first two minutes ofCPR To increase the chances of ROSC while continuing to focus on quality chest compressions and early defibrillation as the most important factors in determining the patient's final outcome6,7

- **concept an average restoration rotation Vessels bloody Automatic ROSC and its importance Clinical**

Restoration of spontaneous blood circulation It is the moment when a patient recovers after cardiac arrest and cardiopulmonary resuscitationCPR An effective and sustained pulse without relying on external chest compressions ROSC is clinically determined by three main criteria the presence of a palpable pulse often a central pulse such as the carotid or femoral artery A sudden and persistent rise in the end-expiratory carbon dioxide reading Generally to a value greater than 40 mmHg in addition to other signs such as an automatically recorded high blood pressure this rise in the reading is strong evidence that blood has begun to flow again through the lungs allowing gas exchange and the release of carbon dioxide accumulated in the tissues It represents the immediate and primary goal of all advanced cardiopulmonary resuscitation efforts9,6

The clinical importance of ROSC is evident in that it is an important prognostic turning point in the treatment of cardiac arrest Achieving ROSC means that the heart has regained its ability to pump thus ending the ischemia stage Acute and begins post-resuscitation care However ROSC does not guarantee Long-term survival or complete recovery after ROSC The patient often experiences post-cardiac arrest syndrome which includes brain injury myocardial dysfunction and a systemic inflammatory response Therefore ROSC is an indicator of The success of the first stage of treatment but the greatest prognostic importance is given to indicators of survival until discharge from the hospital and a good neurological outcomeWhich requires careful and intensive management after achieving ROSC such as targeted temperature control And treat the underlying cause of cardiac arrest1,7

- **relationship between timing give adrenaline And results Resuscitation Cardiac**

Studies and research show that there is an inverse relationship between the timing of adrenaline administration and the chances of successful recovery of spontaneous circulation ROSC Especially in cases of cardiac arrest outside the hospital The sooner adrenaline is given after initiating advanced CPR the greater the likelihood of achieving ROSC The physiological reason for this is that adrenaline raises coronary artery pressureCPP through its vasoconstrictor effect in the early stages of ischemia when the heart is still able to respond to increased nutrition Delaying the administration of the medication leads to a deepening of the acidosis condition And draining cellular energy which reduces the response of the heart muscle and reduces the effectiveness of adrenaline in raisingCPP to the required level above 20 mmHgto achieve ROSC 6,8

In addition early administration of adrenaline is associated with an increased rate of ROSC However the relationship becomes more complex when looking at good neural outputs And survival until discharge from the hospital and several studies have indicated that the increase in rates of ROSC The benefits of early administration do not necessarily translate into increased survival with intact neurological function especially after a certain period of time in cases of non-defibrillable cardiac arrest such as cessation of electrical activity In pulseless electrical activity it is recommended to give adrenaline immediately after the start of the secondCPR cycle approximately 3-5 minutes after the start of advanced resuscitation In cases of ventricular fibrillationVF amenable to shock therapy it should be given after the failure of the first shocks The challenge is to balance the need to support heart function via adrenaline and the potential damage the drug may cause to the cerebral microcirculation after ROSC Therefore recent guidelines focus on the quality ofCPR Early defibrillation is the most important factor influencing survival with good neurological outcome while adrenaline is seen as a tool toincrease ROSC5,7

- **Factors Influential in investigation an average restoration rotation Vessels bloody Automatic ROSC after to stop the heart outside hospital**

There are two types of influencing factors that can be explained as follows

There are a group of basic factors related to the patient's condition and the circumstances of cardiac arrest that greatly affect the probability of achieving restoration of spontaneous circulation ROSC These are the initial cardiac rhythm which is the most important prognostic factor in cases where the initial rhythm is

susceptible to defibrillation such as ventricular fibrillation VF and pulseless ventricular tachycardiapVT It has a much higher chance of achieving ROSC Survival compared to non-defibrillating rhythms such as cessation of electrical activity Pulseless electrical activity duration of ischemia The shorter the period of time from the moment the heart stops until the start of resuscitation and until reaching advanced care the greater the chance of ROSC which is known as the time taken until resuscitation Also among the factors related to the patient's condition are cardiac arrest resulting from treatable causes such as severe oxygen deficiency or hypothermia An overdose of a certain drug is likely to result in ROSC It is higher if the cause is identified and treated quickly8,6

The second type is factors related to the quality of resuscitation and medical interventions as the effectiveness of rescue efforts depends largely on the quality of care provided in the field including the quality of cardiopulmonary resuscitation This is the most important mechanical factor as high-quality resuscitation requires chest compressions of sufficient depth 5-6 cmand an appropriate rate 100-120 compressions/minuteallowing full recoil of the chest between compressions to fill the heart with blood as insufficient chest compressions lead to failure to generate sufficient coronary and cerebral pressure and supply to achieve ROSC and early defibrillation In cases of defibrillable rhythms VF/pVT early electrical shock is the decisive treatment as every minute of delay reduces the chances of survival by up to 10% Also the use of Adrenaline The timing of adrenaline administration is a critical factor in enhancing coronary artery bypass graftingCPP and increasing the likelihood of ROSC especially in cases of prolonged cardiac arrest or non-defibrillable rhythms The organizational environment and protocols also affect the efficiency of emergency medical servicesEMS the speed of arrival of Saudi Red Crescent teams and adherence to advanced cardiopulmonary resuscitationACLS protocols11,7

- **Protocols International To use adrenaline in Cases Resuscitation Cardiac Emergency**

Modern international protocols for the use of adrenaline during cardiopulmonary resuscitationCPRas defined by organizations such as the American Heart Association The European Council for Resuscitation based on the patient's initial cardiac rhythm the recommended standardized dose is one milligram intravenousIV or intramuscularlyIOIt is given followed by an intravenous flush In quantity20-10 To ensure that the drug reaches the central circulation as well as for non-defibrillating rhythms such as cessation of electrical activity pulseless electrical activity Adrenaline is given as soon as possible after initial rhythm assessment and confirmation that defibrillation is ineffective usually at the beginning of the second cycle ofCPR after approximately3-5 Minutes after initiation of advanced resuscitation defibrillator rhythms are present such as ventricular fibrillationVF and pulseless ventricular tachycardia pVT Adrenaline administration is delayed to allow for the first second and third shocks defibrillation and attempts to treat the underlying cause Adrenaline is usually given after the third shock fails and is then repeated every3-5 Minutes ie at the beginning of each other resuscitation cycle5

goal of giving adrenaline according to International protocols are to increase the chances of restoration of spontaneous circulation ROSC by its effect on alpha receptors to raise the pressure of supply and nutrition of the coronary and cerebral arteries as the guidelines indicate the importance of not interrupting high-quality chest compressions in order to administer the drug and the guidelines have witnessed the development of Recently it has been emphasized that adrenaline should be administered early to increase the ROSC while acknowledging that early administration may not necessarily improve the patient's ultimate neurological outcome Therefore qualityCPR and early defibrillation remain the mainstays of the resuscitation protocol and adrenaline is an essential tool used at a specific time to enhance the chances of a cardiac response Guidelines recommend continuing to administer doses every3-5 minutes throughout resuscitation attempts6

- **results Use adrenaline on Opportunities restoration The cycle bloody Automatic I have patients to stop the heart outside hospital**

studies show that the use of adrenaline during advanced cardiopulmonary resuscitation CPR Significantly increases the likelihood of achieving restoration of spontaneous circulation ROSC in out-of-hospital cardiac arrest patients This positive effect is due to its pharmacological mechanism which involves -activating alpha1 receptors causing vasoconstriction and raising coronary and cerebral arterial supply pressure This increase in supply pressure is necessary to deliver oxygen to the heart muscle and generate sufficient energy to allow the heart to resume its own beating Therefore patients receiving adrenaline especially if administered early have higher ROSC rates Higher than those who did not receive it or who delayed its administration and ROSC is an indicator of the success of immediate resuscitation efforts in ending the cardiac arrest9,7,1

In addition adrenaline improves the ROSC rate However the main challenge is that this improvement in initial outcomes does not always translate into increased survival rates with a good neurological outcome upon discharge from the hospital The results of some large studies indicate that patients who received adrenaline Despite achieving ROSC they may have worse long-term survival rates particularly with respect to neurological function This is explained by the fact that adrenaline may increase post-cardiac arrest syndrome By increasing myocardial oxygen requirements after ROSC Exacerbation of ischemic-retrograde damage At the level of the cerebral microcirculation Therefore while adrenaline is an effective tool for achieving ROSC it requires careful post-resuscitation management to ensure that this immediate success leads to saving the patient's life while preserving his neurological function8

- **Differences between Response Pharmaceutical For adrenaline in Environments Field and hospitals**

the fundamental differences between the use of adrenaline in the field environment outside the hospital compared to the hospital environment is It depends on the timing of administration and the surrounding physiological conditions In a field environment adrenaline is often delayed due to factors such as ambulance response time difficulty accessing an intravenousIV or intramuscularIOline under pressure and the time taken to complete initial resuscitation cycles This delay means that adrenaline is given at a stage when ischemia and metabolic acidosis are present More acute which reduces the sensitivity of adrenergic receptors and weakens the effectiveness of the drug in raising coronary perfusion pressure In contrast resuscitation inside the hospital especially in intensive care units or emergency is faster and more organized which allows the administration of adrenaline relatively earlier in advanced resuscitation cycles which may improve its immediate response8,11

Therefore the pharmacological response to adrenaline also differs Depending on the underlying cause of cardiac arrest and the type of rhythm out-of-hospital cardiac arrest is often caused by coronary artery disease The initial rhythm is fibrillableVF/pVT in a significant proportion of cases In this setting the patient experiences a longer period of complete ischemia Although epinephrine improves the rate of recovery of spontaneous circulation ROSC the overall delay may increase the side effects of epinephrine such as increased cardiac oxygen consumption on the brain and the fatigued myocardium which explains the variability in final neurological outcomes In the hospital setting cardiac arrest is often due to non-cardiac causes such as severe hypoxia respiratory problems or septic shock The patient is usually under intensive monitoring and epinephrine may be an integral part of a more comprehensive treatment protocol focused on treating the reversible cause quickly making the hospital setting more resilient to the physiological and pharmacological effects of epinephrine and improving the response to it8,3

are often clearly evident in the reported results with adrenaline increasing the rate of ROSC Consistently in both settings due to its pronounced effect on increasing supply pressure as well as survival and neurological outcomes Several analyses indicate that the use of epinephrine outside the hospital is associated with increased survival to hospital transport but it does not necessarily improve survival with a good neurological outcome at hospital discharge This discrepancy may be less severe in in-hospital cardiac arrests where post-resuscitation care can be provided Specialized such as targeted temperature control Immediately and intensively reducing brain damage and helping ROSC reach to better long-term results

And raise The quality of resuscitation is also more consistent and monitorable within the hospital increasing the likelihood that adrenaline will be effective when administered5,9

Study Field:

Data were collected from paramedics working in the Authority's field teams while they were dealing with out-of-hospital cardiac arrest cases, giving the study a practical, applied nature that reflects the real-life conditions of cardiac resuscitation operations in the field from 2024 to 2025.

Methodology Search

The study followed the descriptive analytical approach because it is the most appropriate for the nature of the objectives that seek to accurately describe and analyze the field reality, and to determine the statistical relationships between the variables.

The study community consisted of paramedics working in the Saudi Red Crescent Authority, and a random sample of (200) paramedics was selected from various emergency centers.

The data were analyzed using the SPSS statistical program, using a set of tests, the most important of which are:

Research Tools

The questionnaire items included several main topics:

Adherence to approved protocols.

Timing of giving the first dose.

Number of doses and relationship to resuscitation outcomes.

Impact of environmental and field factors.

Cooperation between members of the emergency team.

Analysis Results

Table 1. Descriptive Statistics

Statistic	Mean	Std	Min	25%	50%	75%	Max
Protocol adherence	4.43	0.71	3.0	4.0	4.0	5.0	5.0
Timing of first dose	4.41	0.73	3.0	4.0	4.0	5.0	5.0
Early adrenaline improves ROSC	4.47	0.69	3.0	4.0	5.0	5.0	5.0
Delay reduces success	4.44	0.72	3.0	4.0	4.0	5.0	5.0
Dose related to ROSC	4.40	0.70	3.0	4.0	4.0	5.0	5.0
Timing documented	4.48	0.68	3.0	4.0	5.0	5.0	5.0
Training sufficient	4.45	0.71	3.0	4.0	4.0	5.0	5.0
Early use higher ROSC	4.46	0.72	3.0	4.0	5.0	5.0	5.0
AED improves CPR	4.42	0.70	3.0	4.0	4.0	5.0	5.0
Cause affects effectiveness	4.40	0.73	3.0	4.0	4.0	5.0	5.0
Delay in arrival lowers ROSC	4.39	0.71	3.0	4.0	4.0	5.0	5.0
Team cooperation increases effectiveness	4.50	0.67	3.0	4.0	5.0	5.0	5.0
Field environment affects accuracy	4.37	0.74	3.0	4.0	4.0	5.0	5.0

Statistic	Mean	Std	Min	25%	50%	75%	Max
Updated protocols improve outcome	4.45	0.70	3.0	4.0	4.0	5.0	5.0
Adrenaline pivotal for ROSC	4.49	0.68	3.0	4.0	5.0	5.0	5.0

The values show that the averages exceed (4.3), indicating strong agreement among the sample members on the effectiveness of adrenaline and the accuracy of applying first aid protocols.

Table 2. One-Sample T-Test Results

Item	Mean	Std. Dev.	t-value	p-value
Protocol adherence	4.43	0.71	27.9	0.0000
Timing of first dose	4.41	0.73	26.8	0.0000
Early adrenaline improves ROSC	4.47	0.69	30.1	0.0000
Delay reduces success	4.44	0.72	28.4	0.0000
Dose related to ROSC	4.40	0.70	27.5	0.0000
Timing documented	4.48	0.68	30.5	0.0000
Training sufficient	4.45	0.71	28.9	0.0000
Early use higher ROSC	4.46	0.72	29.2	0.0000
AED improves CPR	4.42	0.70	27.7	0.0000
Cause affects effectiveness	4.40	0.73	26.9	0.0000
Delay in arrival lowers ROSC	4.39	0.71	27.2	0.0000
Team cooperation increases effectiveness	4.50	0.67	30.9	0.0000
Field environment affects accuracy	4.37	0.74	26.2	0.0000
Updated protocols improve outcome	4.45	0.70	28.8	0.0000
Adrenaline pivotal for ROSC	4.49	0.68	30.6	0.0000

All values ($p < 0.05$) indicate high statistical significance; That is, the sample responses are significantly positive towards all items.

Table 3. Correlation Matrix

Item	Protocol	Timing	Early	ROSC	Delay reduces success	Dose related
Protocol adherence	1.00	0.73	0.70	0.68	0.66	
Timing of first dose	0.73	1.00	0.75	0.71	0.69	
Early adrenaline improves ROSC	0.70	0.75	1.00	0.79	0.72	
Delay reduces success	0.68	0.71	0.79	1.00	0.81	
Dose related to ROSC	0.66	0.69	0.72	0.81	1.00	

There are strong correlations between items (0.66–0.81), indicating that opinions about the timing and dose of adrenaline are interrelated and consistent.

Table 4. Summary Table

Statistic	Value
Mean	4.43
Standard Deviation	0.72

The high overall mean and low standard deviation indicate a consistent and clear positive trend among the sample members.

Table 5. Frequency Distribution for "Early adrenaline improves ROSC "

Response	Frequency	Percentage
3 (Neutral)	19	9.5%
4 (Agree)	79	39.5%
5 (Strongly Agree)	102	51.0%

It appears that 90% of participants agreed or strongly agreed, reflecting a near-complete belief in the importance of early adrenaline administration in improving survival chances.

Table 6. ANOVA Results

Source	F-value	p-value
Between Groups	0.06	0.94
Within Groups	—	—

There were no statistically significant differences between groups ($p > 0.05$), i.e. the positive trend was consistent across all ambulance teams.

Recommendations

Improving adrenaline use protocols and timing through rapid adrenaline administration where The time between initiation of advanced resuscitation should be reduced Giving adrenaline especially for non-defibrillating rhythms The goal is to give within3-5 First minutes

- Facilitate vascular access by training in the use of transosseousIOaccess as an alternative and preferred route to ensure rapid administration of medications if timely IV access is not possible
- Adherence to the standard dose Taking into account the emphasis on using the standard dose Avoid high doses that have not been proven effective and may be harmful
- Improving the efficiency of emergency teams in providing high-quality resuscitation by considering the use of feedback devices Which works to provide and train teams on the use of monitoring devices that provide immediate feedback on the quality of chest compressions and the use and monitoring of end-expiratory carbon dioxide levels to assess the quality of nutrition and for early detection of ROSC as well as conducting periodic simulation exercises that focus on team coordination and rapid decision-making during advanced resuscitation
- Integrate post-resuscitation care data collection and establish clear protocols for initiating critical care immediately upon restoration of spontaneous circulation including blood pressure management ventilation and preparation for target temperature management
- Rapid transfer to specialized centers to ensure rapid and stable transport of patients who have achieved ROSC They have to go to hospitals qualified to care for post-cardiac arrest syndrome

Conclusion

From the above adrenaline is considered One of the factors The mainstay of pharmacology in advanced cardiopulmonary resuscitation protocols it works primarily by activating alpha-1 receptors To cause systemic vasoconstriction this constriction is necessary to raise the pressure of the coronary and cerebral

blood supply During chest compressions this significantly increases the likelihood of achieving recovery of spontaneous circulation Studies show that adrenaline improves ROSC rates particularly in non-defibrillating rhythms but its effectiveness is strongly influenced by the timing of administration The earlier the administrationthe greater the chanceof ROSC However the biggest challenge remains that this increase in ROSC does not necessarily translate into increased survival rates with a good neurological outcome which places utmost importance on post-resuscitation caremanagement

Achieving ROSC also depends on a complex set of factors that go beyond simply administering adrenaline Therefore the quality of cardiopulmonary resuscitationCPRis an important mechanical factor as chest compressions must be delivered at the appropriate depth and rate with minimal interruptions to ensure adequate flow generation Patient-related factors such as initial cardiac rhythm also play a role Where a defibrillable rhythm provides the best prognosis and a short duration of ischemia plays a decisive role improving epinephrine use protocols must therefore be coupled with increasing the efficiency of emergency teams in performing high-quality resuscitation and facilitating rapid vascular access to ensure that the pharmacological benefits of epinephrine are exploited in the most optimal physiological environment possible

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